EASTPORT HARBOR

MAINE

SURVEY

(REVIEW OF REPORTS)

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

JULY 17, 1959

SURVEY

EASTPORT HARBOR, MAINE

SYLLABUS

The Division Engineer finds that prospective benefits are sufficient to warrant improvement of Eastport Harbor, Maine. He therefore recommends that a project be authorized to provide for construction of a cellular steel breakwater 500 feet long parallel to the central waterfront with an anchorage basin of 1.4 acres behind the breakwater with depths of 10 and 14 feet. The estimated first cost of construction is (March 1959) $550,000 with pre-authorization study costs of $10,000, the total project cost would be $560,000, plus $1,600 annually for maintenance, all to be borne by the United States. The recommendation is made subject to conditions of local cooperation which include providing an adequate public landing joining the breakwater to shore, mooring facilities and berths at the landing and breakwater, and a fish pump. The estimated cost of this work is $150,000, to be borne entirely by local interests. The improvement, which will benefit commercial navigation, has a benefit-cost ratio of 2.3.

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM 54, MASS.

NEDGW 17 July 1959

SUBJECT: Survey (Review of Reports) of Eastport Harbor, Maine

TO: Chief of Engineers, Department of the Army, Washington 25, D. C.

AUTHORITY

1. This report is submitted in compliance with a resolution adopted December 6, 1950 by the Committee on Public Works of the United States Senate, which reads as follows:

> "RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on Eastport Harbor, Maine, transmitted to Congress on May 25, 1937, with a view to determining whether any modification of the recommendations contained therein with respect to improvement of the harbor is advisable at this time."

2. Pursuant to the above authorization, a favorable preliminary examination report was submitted by the Division Engineer on January 13, 1956, recommending that a survey be made to determine the advisability and cost of any improvement which might be found to be justified, and the local cooperation required. The report of the Board of Engineers for Rivers and Harbors was favorable and recommended that a survey be made.

3. A review report of survey scope was assigned to the New England Division by letter of the Chief of Engineers, dated April 12, 1956.

PURPOSE AND EXTENT OF STUDY

4. Eastport Harbor has been studied to determine if a Federal improvement to provide protection for boats at the waterfront is warranted. In the preparation of this report, a detailed hydrographic survey was made, consisting of soundings and probings of the waterfront area. In this connection also, the hydrographic survey of the entire Eastport waterfront made in relation to the unfavorable survey report submitted in 1937 was studied. Commercial statistics and other data pertaining to the harbor have been examined. A public hearing was held at Eastport, Maine, September 28, 1955, and information obtained therefrom is described in Paragraphs 13 to 22 inclusive of this report. The information obtained from the public hearing has been further supplemented by recent contacts with local interests and by correspondence submitted by them.

DESCRIPTION OF NAVIGATION CONDITIONS

5. Eastport Harbor is located on the east side of Moose Island, Maine, and on Friar Roads, an international boundary passage between Moose Island and Campobello Island, New Brunswick. The harbor lies about 3 miles north of Lubec, Maine and about 40 miles east-northeast of Machias, Maine. Eastport is the most easterly city in the United States.

6. Friar Roads is a rectangular body of water extending about two miles north and south, and about one mile from Campobello Island on the east to Moose Island on the west, with deep water throughout the entire area except along the Eastport waterfront itself. It has two entrances from the sea, one north and one south of Campobello Island. The north entrance is through Head Harbor Passage, a straight natural channel, in Canadian Waters, 2,000 feet wide and 90 feet or more deep between Campobello Island and Deer Island. The south entrance is through Quoddy Roads and Lubec Narrows, international boundary waters, which have a dredged channel providing a depth of 12 feet at mean low water for a width of 500 feet. Anchorage is available off the city in Friar Roads itself.

7. Eastport Harbor is exposed to winds from the north through the northeast, and to winds from the south. Although protected to the east and southeast by Campobello Island, it is exposed to limited fetches of wind from these directions. Prevailing winds are from the south during the summer, and from the west through the northwest during the winter, the average velocity for the year being 10.7 miles per hour. Storms of maximum velocity are from the east and northeast. The mean tidal range at Eastport is 18.2 feet and the spring range is 20.7 feet. The extreme recorded tides were 23.2 feet (November 1945)

above and 4.2 feet (January 1943) below mean low water. The harbor is ice free all year. Tidal currents in Friar Roads have an average peak velocity of 3 knots. Whirlpools and eddies that are sometimes dangerous for small boats are encountered between Dog Island and Deer Point, about 0.5 miles northwestward of the harbor, at the eastern end of the Western Passage to Passamaquoddy Bay. Such whirlpools and eddies are reported to be strongest about three hours after low water. The area is shown on U. S. Coast and Geodetic Survey Chart No. 801, and on the map accompanying this report.

TRIBUTARY AREA

8. The City of Eastport occupies the whole of Moose Island, and is important as one of the major centers of the nation's sardine canning industry, and as a summer colony. The manufacture of extracts from fish scales and scrap for use in the manufacture of paints and other materials is also one of the city's major industries. In addition, several other small industries are located at Quoddy Village, at the western end of the island. In 1955 the permanent population of the city was about 3,200 and the assessed real estate evaluation was about $1,669,000. The port is a customs port, and the city is a rail terminus and shopping center for many residents of nearby islands. It is connected to the north and the west by the Maine Central Railroad, which has spurs to two wharves. In addition, the city is served by four ferries: the Deer Island Ferry, which operates between Eastport, Deer Island, Campobello Island, and St. Andrews, New Brunswick, the year round; the Passamaquoddy Ferry, which transports general cargo and freight between Eastport and Lubec the year round; a car ferry to Deer Island, which operates during the summer; and the Seaport Navigation Ferry which transports passengers between Eastport and Lubec during the summer. Maine State Route No. 190 extends from U. S. Route No. 1 and terminates in the city.

BRIDGES AFFECTING NAVIGATION

9. There are no bridges crossing any portion of the waterway under consideration.

PRIOR REPORTS

10. There has been one prior report on Eastport Harbor. This report, an unpublished survey report submitted to Congress on May 25, 1937, is the report under review. The report was unfavorable to the construction of a stone filled wooden crib breakwater extending from the waterfront at Eastport and designed to provide a protected anchorage area. Benefits accruing to the then existing commerce at Eastport were found to be inadequate to justify the relatively high

construction cost of the desired breakwater, particularly inasmuch as the breakwater which was found to be most nearly justifiable economically was in a location then unacceptable to local interests.

EXISTING CORPS OF ENGINEERS' PROJECT

11. There is no existing Federal project for Eastport Harbor, and no improvements for navigation have been made either by local or State interests. An existing project for Lubec, authorized by Congress in 1894, and modified in 1954, provides for the improvement of the southern channel 500 feet wide and 12 feet deep through Lubec Narrows, for the extension of a previously constructed breakwater at Gun Point, and the construction of a stone breakwater at Short Point. Construction of modifications authorized for the Lubec project was completed in 1956.

TERMINAL AND TRANSFER FACILITIES

12. Approximately 17 wharves are located along the easterly shore of Eastport, on the westerly side of Friar Roads, extending for a distance of about one mile from north to south, with depths at their ends varying from 0.0 to 18.0 feet at mean low water. The most active of these are 8 used in the handling of fish, 5 used by ferries and in the handling of freight and general cargo, one used as a customs wharf, one used in the handling of oil and tar, one used by the American Can Company, and the Wadsworth Wharf at which ships chandlery, fuel, and supplies are available. In addition, there are 2 fish wharves in Prince Cove south of the main harbor area, 2 wharves at reduction plants in Broad Cove on the southerly side of Moose Island, and 2 cannery wharves on the north side of the island. Two wharves owned by the Maine Central Railroad and used by the Passamaquoddy Ferry and Navigation Company, are equipped with rail sidings and transit sheds. Repairs to machinery are made off the docks by 2 marine repair shops, and machinery is installed in Canadian built ships. There are numerous undeveloped areas along the waterfront that are available for future use.

IMPROVEMENT DESIRED

13. In order to give local interests an opportunity to express their views with respect to improvement in Eastport Harbor, a public hearing was held at Eastport, Maine on September 28, 1955. The hearing was attended by representatives of the State and City Governments, by representatives of the packing and canning industries and other fishing interests, and by representatives of the ferry companies and other business interests. Among the exhibits presented at the hearing were letters from four packing companies and from the Passamaquoddy Ferry and Navigation Company, and a brief prepared by the Eastport Citizens Committee for Harbor improvement.

14. Local interests expressed a desire for the construction of a breakwater at some point along the waterfront, or nearby, to provide a protected landing area where fish and general cargo could be landed in rough weather, and if possible to provide sufficient area for the protected anchorage of a small number of fishing and other craft. Although evident advantages would accrue from the location of the breakwater near the business center of the city, local interests expressed the belief that if engineering considerations made construction either to the north or the south of the central waterfront more feasible, virtually equivalent benefits would nonetheless accrue.

15. Local interests stated, generally, that the highly exposed nature of the harbor, together with the frequency of relatively high winds, many times made it difficult or impossible to land fish or other cargo, with consequent loss through delay. Local interests stated further that inasmuch as no protected anchorage was now available along the waterfront, it was necessary for fishing vessels to anchor at remote points with consequent loss of time. The desired breakwater, it was believed, would provide adequate protection to craft while landing and unloading the catch, and limited protected anchorage space in emergencies.

16. Local interests indicated that their desires were essentially the same as those considered unfavorably in the unpublished survey report of 1937, but expressed the belief that the increase in the amount of commerce, and particularly in the number of fish plants in Eastport will produce substantially greater benefits than would have then been provided by the desired construction. In addition, the belief was expressed that the majority of the potential benefits would accrue from the location of the breakwater at any point along the waterfront, rather than, as was thought in 1937, only at one or two possible points. Finally, it was observed that rights of way which had not been available in 1937 could now be provided, thus making possible the consideration of additional locations.

17. It was stated that at the present time there is no safe berth along the waterfront during an easterly, northeasterly, or southeasterly storm, the directions from which storms predominate. During such storms, a boat must be moved to the opposite side of the island to lay at a private wharf, the MacNichol Wharf, which has been condemned and which at best can accommodate only four or five boats. The only protection owners of small boats have in rough weather is to beach their boats.

18. At present, the only public landing is the wharf approach to the Custom and Immigration offices, which is rented by the city from a local business man. The landing offers no protection from wind or sea, and is adequate to handle the traffic moving over it. However, were the desired breakwater provided so that a protected area were available the city has been authorized by the State of Maine and in a city referendum to build or improve a public landing. With the Act of the State

Legislature, the city has the necessary authority to act in any manner it may deem necessary to provide the required local cooperation for the desired improvement. In 1958 local officials indicated that their choice of location for improvement was in an undeveloped area at the foot of Washington Street. Mr. B. G. Turner, Vice President of Mearl Corporation, has offered to give company waterfront property, to the City for development of a public landing.

19. The Passamaquoddy Ferry and Navigation Company, which transports an average of about 30,000 tons of commodities annually between Lubec and Eastport, stated that no wharf or anchorage in Eastport Harbor offered protection during heavy onshore winds. They further stated that it was necessary to have vessels fully manned and to navigate them from wharf to wharf and cove to cove to derive any protection under storm conditions. Their largest boat has a loaded draft of 13 feet. They cited an instance of considerable damage sustained by a sardine carrier at Deep Cove during an easterly storm in the fall of 1954, and of damage sustained by their own vessel when it parted '72 thread deck lines doubled' while berthed at the Maine Central Railroad Company wharf in January, 1955. In January 1959, one of their boats suffered damages exceeding $5,000 as a result of an easterly storm.

20. The Holmes Packing Corporation, which receives over its wharf an average of approximately 2,600 tons of fish annually in an average of 133 vessel trips stated that their wharf is completely exposed to easterly winds, from which direction maximum storms occur, and that during severe weather it is necessary to maintain crews aboard their carriers and move them from cove to cove as the wind shifts. They stated their belief that a breakwater would greatly facilitate the fishing commerce of the port, and expressed the opinion that the area protected should be sufficient to shelter a substantial number of small boats in emergencies.

21. The Peacock Packing Company, which owns four boats and charters eight Canadian boats, stated that it is necessary for both American and Canadian vessels to seek refuge at nearby Canadian Islands in bad weather. They stated that at present it is impossible to leave a boat at the Eastport waterfront in any storm from the northeast, east or southeast; that it is necessary to get boats away from the waterfront in rough weather, and many times to shift them from point to point to gain protection. They cited the loss in December 1954, of a 30 foot boat valued at $3,000 and used for personal business.

22. The Riviera Packing Company stated that high tides at Eastport are dangerous to vessels in the vicinity of Clarks Ledge, and that the lack of protected public landing facilities was highly detrimental to shipping at Eastport, whose deep and extended harbor would

otherwise be highly attractive to commerce. They expressed the belief that the provision of adequate protected landing facilities would encourage the shipping of other Maine products from Eastport, since it is a conveniently accessible rail terminus. They cited the fact that when adverse weather conditions prevent sardine carriers from landing their catch at Eastport, the canning plants, upon which the economy of the town is heavily dependent, are deprived of their raw materials and cannot operate. They further stated their opinion that more adequate protection would encourage the further development of tuna fishing and tuna canning, which has recently been started at Eastport. They particularly cited the proximity of Eastport to rich fishing grounds, which makes it a natural fishing port, and hence in their opinion potentially productive of substantial benefits to be derived from the desired improvement.

EXISTING AND PROSPECTIVE COMMERCE

23. Commerce reported at Eastport Harbor by the records of Waterborne Commerce of the United States averaged about 66,500 tons annually from 1952 through 1957 inclusive, varying between a maximum of about 85,000 tons in 1952 and a minimum of about 50,000 tons in 1955. Of the total average reported commerce, over 50 percent has consistently been in fish products. Approximate total tonnage of major commodities are shown below for the period from 1954-1957 inclusive.

	1954	1955	1956	1957
fish and fish products	35,000	26,000	31,000	35,000
metals and metal products	8,000	5,000	8,000	7,500
inedible animal products	6,500	9,000	9,000	9,000
other commodities	13,500	10,000	12,000	13,500
totals	63,000	50,000	60,000	65,000

24. The substantial commerce in metals and metals products is attributable to the fact that Puss'n Boots cat food is manufactured at Lubec by the Coast Fishing Division of the Quaker Oats Company, and materials and containers are shipped from Eastport after delivery by rail, and the finished product returned to Eastport for retransportation by rail. In addition, the American Can Company operates a factory at Lubec and a warehouse at Eastport, transhipping all tin plate, coating, and container material from Eastport to Lubec by a company owned ship, and then shipping finished cans back to Eastport for further transhipment.

25. Most of the fish canning companies also have plants at Rockland and Portland. They operate the plants where the fish are most plentiful, and do not open certain plants at all some years. The 1958 season was an unusual year with only two canning factories, Holmes and Riviera, running full time and one other plant, Wilson, operating for a short time.

26. The two most active reduction plants in 1958 were the Mearl Corporation and the Eastern Marine Products Company both located in Broad Cove at the south end of Eastport. The Mearl Corporation handles an estimated 20,000 tons of commerce annually, consisting of herring, fish scales, fish meal, and fire fighting foam made from cattle hoofs imported from South America. This corporation is enlarging its plant but no estimate was made of future tonnages that would be handled. The Eastern Marine Products Co. manufactures fish meal, oil, and solubles, handling an estimated 4,000 tons of commerce annually.

27. In addition to this reported commerce, records indicate that there are from 60,000 to 90,000 passengers annually landed at Eastport. The commerce at Eastport is expected to increase in the future as a result of a normal population increase. In the event the Passamaquoddy power project is built, the commerce of Eastport would possibly be several times the present commerce.

VESSEL TRAFFIC

28. Vessel trip totals of 27,272, 25,724, 31,522, 29,624, 33,210 and 30,564 were reported in Eastport from 1952 through 1957 respectively. Eastport is the home port for approximately 60 fishing and other commercial craft ranging in length from 25 to 80 feet. The sardine fishing season extends from April 15 to December 1, with the best season from June to September. Between September and January, from 12 to 15 trawlers annually fish out of Eastport, and during 1954-56 a fleet of 18 to 20 commercial scallop boats from all along the Maine coast made their headquarters at Eastport and are expected to continue to do so.

29. In addition there are four ferries operating into Eastport. The Passamaquoddy Ferry and Navigation Company operates a 65-foot general cargo vessel to Lubec for one trip daily through the year. The Seaport Navigation Company operates a passenger ferry to Campobello Island, Deer Island, and St. Andrews twice daily throughout the year. In addition, a passenger ferry operates two trips daily to Lubec during the summer, and an auto ferry operates 8-10 trips daily to Deer Island during the summer.

30. As a customs port, Eastport Harbor is used by large numbers of transient vessels, commercial fishing boats built in Nova Scotia entering through Eastport, and foreign entries and clearances through

the port exceeding those in any other port in the State of Maine. There were 15,035 entries to Eastport in Fiscal Year 1958 from foreign ports. The entries consisted of 4,132 manifested vessels, 3,380 small boats under 5 net tons that only report, and 7,523 car ferries, mail boats and freight.

DIFFICULTIES ATTENDING NAVIGATION

31. The difficulties attending navigation in Eastport Harbor are those associated with extreme tides, strong tidal currents, and lack of anchorage areas and berths protected from relatively frequent winds and storms from the northeast, east and southeast. During such storms a boat must be moved to the opposite side of the island or seek refuge at nearby Canadian islands. The only protection owners of small boats have, that do not seek shelter elsewhere in rough weather, is to beach their boats at high tide. Frequently it is difficult and at times impossible to land fish or other cargo, during rough weather, due to the highly exposed nature of the harbor.

WATER POWER AND OTHER SPECIAL SUBJECTS

32. The waterway is presently tidal, but Passamaquoddy tidal Power Project would include the entire city waterfront in the lower pool with controlled elevation between 0 and 8 feet above mean low water. This control of tide elevations would reduce the required height of any protective structure about 10 feet. Matters of flood control, pollution, and related subjects are not pertinent to this investigation. None of the contemplated work would have an adverse effect on wildlife or shellfish.

PLAN OF IMPROVEMENT

33. There was unanimous agreement among local interests in a desire for a breakwater to provide a sheltered area where fish and cargo could be handled safely in rough weather and small boats could be moored out of danger. City officials agreed to provide access and a public landing at any location found to be most suitable during this investigation.

34. The locations selected by the report under review were re-evaluated during this study. The Clarks Ledge location has the disadvantage of being almost a mile north of the central waterfront, and in the area now being considered for an approach channel to a lock in a Passamaquoddy Tidal Power Project dam. The location off Wardsworth dock has a very small area available for shore access and only a limited anchorage area could be protected. The location now favored by local interests lies between Wardsworth dock and Holmes wharf.

This area has the advantages of being at the central waterfront with space for adequate public shore facilities. Preliminary cost estimates for structures at each of the three above locations indicated that the location now favored by local interests would be somewhat better than those selected by the previous report. In view of the above, the location considered in this report is the area between Wardsworth dock and Holmes wharf as desired by local interests.

35. Rock filled timber crib breakwaters and landings are common at nearby Canadian ports. This type of structure was suggested by local fishermen and was considered by the report under review. However in recent years the Eastport waterfront has become infested by marine worms and it is reported that treated timber will only last 6 or 7 years. In view of the probable short useful life and the difficulties of construction no further consideration was given to a timber crib breakwater.

36. A stone riprap breakwater would not permit boats to tie alongside and would have to be placed in deeper water than a vertical walled structure to protect a comparable area. The depths off the Eastport waterfront increase rapidly so that a stone breakwater would have to be about 10 feet higher than a comparable vertical walled structure. A breakwater of sheet steel piles constructed with segmental cells filled with sand and gravel could be paved and fendered by local interests and used in conjunction with a public landing. Cost estimates indicated that this type of structure would be more economical than a stone breakwater.

37. Information provided by local interests indicated that about 40 craft would be expected to use the protected anchorage regularly. About 20 of these would be seiners and carriers and the other 20 would consist of all other small commercial craft. Because it is not expected that all these craft would be in the harbor at any one time it is considered that, in addition to protected berths at a public landing, space will be required in the Federal anchorage for about 20 craft. A space of about 1.4 acres would permit maneuvering, a safe entrance, and mooring 20 boats alongside the breakwater. There is little indication that navigation will increase at Eastport in the future. The protected waterfrontage could easily be improved to accommodate any moderate increase in navigation that might develop. Most of the craft expected to use the anchorage would not require over 10 feet of depth, but because of the possibility of minus tides and wave action and to accommodate a few cargo boats that draw 12 and 13 feet of water when loaded, a depth of 14 feet is considered necessary at the entrance to the anchorage.

38. Local officials were consulted on possible arrangements of the breakwater, anchorage, and public landing. The plan of improvement selected for consideration in this report is consistent with local

desires to extend a public landing to the breakwater from an area given to the City for a public landing.

39. The plan of improvement selected as best fitting the needs of navigation and the desires of local interests consists of a Federal project to provide a sheet steel cellular breakwater 500 feet long located parallel to the waterfront between the Holmes wharf and Wardsworth dock, and an anchorage area of 1.4 acres behind the breakwater with a depth of 14 feet in the southern 230 feet and 10 feet in the northern 250 feet. Local interests would provide a public landing extending from shore to breakwater and all fenders, berths and mooring facilities.

40. The breakwater has been designed for a wave height of 10 feet, which is considered to be the maximum possible across the restricted fetch through Head Harbor Passage. To prevent serious overtopping the top should be about 8 feet above mean high water. The depth of water at the considered location is 16 to 20 feet. Probings indicate sand, gravel and boulders in this area. The proposed structure has therefore been designed with 25 sheet pile cells of circular segments of 15-foot radius joined at Y piles to a cross wall every 18 feet. The breakwater would be 30 feet wide at the center of each cell and 25 feet wide at the cross wall. The two end cells with the same 15-foot radius would be 25 feet long. Pile penetration would be 10 feet and the cells would be filled with sand and gravel for stability. The top elevation would be 26 feet above mean low water.

SHORE LINE CHANGES

41. The plan of improvement considered for Eastport Harbor would have no effect on the shore line of the harbor.

REQUIRED AIDS TO NAVIGATION

42. The U. S. Coast Guard has been consulted and has indicated the proposed breakwater would require no navigation aids.

ESTIMATES OF FIRST COST

43. The proposed breakwater would be constructed of 1500 tons of steel sheet piling in segmental cells with maximum and minimum widths of 30 and 25 feet, respectively, and tie walls from Y piles every 18 feet. The segments would be filled for stability with 25,000 cubic yards of sand and gravel. Construction of the anchorage would require removal of 12,000 cubic yards of sand and gravel. The estimated cost for the 500-foot breakwater and 10 and 14-foot anchorage, including an allowance for contingencies, is detailed in an Appendix to this report and shown below. Local costs for landing facilities are considered self-liquidating and are not included in the project economics.

Project Construction (General Navigation Facilities)

Breakwater and Anchorage	$510,000
Engineering and Design	10,000
Supervision and Administration	30,000
Total Project Construction Cost (March 1959)	$550,000
Pre-authorizarion Studies	10,000
Total Project Cost (March 1959)	$560,000

44. Sheet piling is considered the best material to use for the breakwater. Studies of the corrosion rates of steel in the Eastport area indicate that a project life of 25 years is reasonable for unprotected 1/2 inch thick steel. There are a number of protective methods which might be used to extend the project life. Methods of protection should be investigated during the final design of the breakwater with a view to extending the project life and reducing the economic cost of the project.

ESTIMATES OF ANNUAL CHARGES

45. The steel of the proposed breakwater is not durable enough to last the customary assumed project life of 50 years without protection. The estimated annual charges have been computed using an assumed project life of 25 years and an interest rate of 2.5 percent. It is considered there will be little or no maintenance cost for several years with possibly a small amount near the end of the project life. This maintenance cost is estimated as a Federal annual charge. Federal project investments and annual charges are as follows:

Investment	$560,000
Annual Charges	
Interest (0.025)($560,000)	$14,000
25 year Amortization (0.02928)($560,000)	16,400
Maintenance	1,600
Total Project Annual Charges	$32,000

ESTIMATES OF BENEFITS

46. Benefits have been evaluated from the improvement of Eastport Harbor by construction of a protective breakwater and sheltered anchorage at the central waterfront. Benefits to commercial navigation accrue primarily from increased fishing time gained by the reduction or elimination of delay in landing the catch at Eastport, from the

reduction or elimination of delay in the transport of general cargo; from the reduction of time lost by reason of owners having to base sardine carriers, seiners, and all other ferry, cargo, and fishing vessels away from Eastport to find safe anchorage; and from reduction of vessel damage sustained in rough weather.

47. The operating cost of a sardine carrier is about $12 per hour. They carry an average load of 50,000 pounds of sardines for an average trip of about 12 hours. The Carriers go out to the fish weirs and traps or to the seiners which hold the catch alive in the seiners until the carrier arrives. The fish are pumped into the carrier thus killing and half scaling them in the process. The canneries pay about $22.50/1000 pounds for fish delivered to the wharf within 8 hours from the time they are loaded on the carrier. The seiners receive about $17.50/1000 pounds for fish they catch. The travel time for a carrier load is estimated at about 5 hours and about one to two hours is required to unload the carrier.

48. If the weather is bad at Eastport, with easterly winds of over 25 miles per hour which cause waves over 3 feet high, the carriers will not normally try to bring in fish. If the fish are running any delay to the carriers results in a direct loss to the seiner because he cannot catch more fish while his nets are full. When the fish cannot be landed the carriers either do not pick up the fish from the seiners, or if they do load them they must wait till the weather lets up before they try to land them. Indications are that a few carrier loads spoil each season because of bad weather at Eastport. Spoiled fish are usually purchased by the reduction plants. They will often pay as much for the spoiled fish as the canneries pay for fresh fish, so there is little or no loss if the carriers pick up the fish from the seiners.

49. There are 7 canneries and 5 reduction plants in Eastport that utilize the fish caught in the area. It is not expected that all canneries or reduction plants will operate full time each year. In recent years the herring have been scarce near Eastport and during the last season only two canneries and two reduction plants ran full time. However this was considered by local interests as far below an average year. When they are operating the canneries each require about 50,000 pounds of herring per day or about one carrier load. Two reduction companies have expanded their plants to the point where it is estimated they too could utilize at least a carrier load of fish each day. The other reduction plants are of less capacity.

50. The sardine season is from April 15 to December 1, with the best season from June to September. Local interests estimate there are about 100 days during each season when the seiners and carriers

operate and an additional 12 days lost each season when the seiners can operate and the fish are running but the carriers cannot land fish. Data collected from local interests indicate that in the last 8 years an average of 20,000 tons of fish have been received at the Eastport canneries each fishing season. This accounts for about a half of the fish and fish products reported and for less than a third of the total waterborne commerce reported. For a fishing season of 100 working days, this commerce averages about 400,000 pounds daily. Of this amount it is estimated that 300,000 pounds are caught by the seiners and the remainder is caught in fish traps.

51. A protected landing would permit the carriers to land fish an estimated 12 additional days each season. The addition of 12 days fishing time for the seiners would enable them to catch an additional 3,600,000 pounds of fish each season. At the average price to the seiners of $17.50/1000 pounds this additional catch is worth $63,000 to the seiners. Because the seiners now operate the days that are lost because the carriers cannot land fish at Eastport, there would be little or no additional cost to the seiners to catch the additional fish. However, there will be an additional cost to land this fish at the protected landing and transport it in trucks to the canneries. This cost is estimated at $2.00/1000 pounds, or about $7,000 for the additional fish catch. The net value of the increased fish catch and the general benefit resulting from provision of a protected landing is therefore estimated at ($63,000 - 7,000) $56,000.

52. There is no sheltered anchorage in Eastport Harbor for the carriers and seiners that use the harbor. Many of these vessels spend an average of 1/2 hour per day seeking sheltered anchorage, for an average of 100 days during the herring fishing season. It is estimated that 10 of these craft that normally seek shelter elsewhere would base at Eastport if protected anchorage was available. The cost of moving these boats, estimated at $12 per hour, or about $6,000 annually, would be eliminated and is considered a direct general benefit from the improvement.

53. Other commercial craft in addition to those connected with the herring business (fishermen, draggers, scallopers, ferries, and general cargo handlers) are also required to seek shelter elsewhere. It is estimated that an average of 10 of these craft would also use the Federal anchorage at least 200 days a year, thus eliminating the 1/2 hour time travel to shelter. The cost of operating these craft, estimated at $8 per hour, or $8,000 annually, would be eliminated and is considered a direct general benefit from the improvement. The tangible benefit occuring to the improvement of Eastport Harbor by reduction of vessel operating costs is therefore taken to be $14,000 annually.

54. Local interests have reported vessel damages at Eastport Harbor of $500 to a carrier in 1954, total loss of a $3,000 launch in 1956, and $5,000 damages to a cargo vessel in 1959. In addition, there is a continual loss from damage to boats, cargo and equipment resulting from landing at Eastport during rough weather. The total present annual storm damage is estimated at $5,000. The proposed improvement would eliminate part of this damage because rough weather landings could be made at a sheltered landing. The reduction of storm damage is estimated at 60 percent of the present damage, or $3,000 annually, and is considered a direct general benefit from the improvement.

55. Eastport is the only coastal rail terminal in the vicinity and is the supply point for a number of islands, nearby ports, and waterfront towns in Canada and Maine. There are 4 ferries operating into Eastport in addition to general cargo vessels and mail boats. Eastport had over 15,000 entries of vessels from foreign ports last year, mostly from nearby Canadian ports. The U. S. Customs is considerably handicapped in handling foreign entries through customs by the lack of adequate public landing facilities at the Central waterfront. The proposed improvement and public landing would eliminate much of the present delays and inconveniences now being experienced. Based on the foregoing, the tangible benefit accruing to the proposed improvement, by virtue of a decreased cost in handling mail, cargo, and passengers to and from nearby islands and ports, is taken to be $1,000 annually.

56. The tangible annual benefits which are estimated to accrue from the proposed improvement of Eastport Harbor, all general benefits, are summarized below:

Source of Benefit	Evaluated Benefit
Increased fish catch	$56,000
Reduced operating cost for moving boats to sheltered anchorage	14,000
Reduced losses from storm damage to boats, cargo, and equipment	3,000
Reduced cost of handling mail, cargo and passengers	1,000
Total Annual Benefit	$74,000

57. The proposed improvement will also contribute to the general safety and convenience of the citizens of the area and the U. S. Customs service. No pleasure boats are based at Eastport but an average of 100 visiting pleasure boats are reported to call at the Wardsworth wharf each boating season. It is expected the proposed improvement would be utilized by some visiting pleasure boats

for convenient docking, overnight stops, and possibly to seek refuge during storms while they are cruising nearby. There is no indication that any substantial benefit to recreational craft would result from the improvement. It is not expected that the improvements would attract any recreational boats to the area.

58. Local interests expect a substantial increase in the commercial activity of the City to result from construction of the improvement and the public landing. They expect the improvement to attract additional tourists and retail customers. This type of benefit is considered to be both secondary and intangible and therefore has not been evaluated.

COMPARISON OF BENEFITS AND COSTS

59. A comparison of the estimated annual benefits totalling $74,000 and the estimated annual charges totalling $32,000 results in a benefit-cost ratio of 2.3 to 1.

PROPOSED LOCAL COOPERATION

60. Local interests should be required to agree to hold the United States free from damages due to the construction and maintenance of the improvement and to provide without cost to the United States all lands, easements and rights-of-way necessary for the construction of the project and for the subsequent maintenance thereof. It is expected that shore access will be required only for handling construction materials and supplies.

61. The benefits to be derived from the proposed improvement are general in nature. Local interests will therefore not be required to contribute toward the construction cost of the breakwater.

62. At the present time, there is no permanent public landing at Eastport Harbor. So that all citizens may share in the proposed improvement, local interests should be required to provide a fish pump, a suitable public landing joining the breakwater to shore and mooring facilities in the Federal anchorage, all open to all on equal terms. These facilities could be provided by constructing a steel sheet pile wharf filled with sand and gravel from shore, to the breakwater, paving the landing and breakwater, fendering the landing and breakwater, constructing berths and a pumping station with a fish pump to unload fish. The total cost to local interests to provide the necessary facilities is estimated at about $150,000. Officials of the State of Maine and the City of Eastport have indicated that they would provide assurances that the requirements of local cooperation described above would be met.

APPORTIONMENT OF COSTS AMONG INTERESTS

63. Since all evaluated benefits are general in nature, the entire cost of the breakwater and anchorage now estimated at $560,000 (March 1959), will be borne by the Federal Government. Providing the required public landing facilities is considered a local expense, these local costs are considered to be self-liquidating.

COORDINATION WITH OTHER AGENCIES

64. All Federal, State and local agencies having interest in the improvement of Eastport Harbor were notified of the public hearing at Eastport, Maine on September 28, 1955. All agencies that expressed an opinion were in favor of the proposed improvement. The City of Eastport, represented by the Councilmen and the City Manager, reviewed all plans considered in this study and they favor the final plan proposed. The City has been authorized by the State of Maine and a city referendum to build or improve a public landing. With the Act of the Legislature, the City has the authority to act in any manner it may deem necessary to provide the required local cooperation for the proposed improvement.

65. The United States Coast Guard reviewed the plan of improvement and indicated that it will not require any navigation aids. The United States Fish and Wildlife Service reported that the estimated increased fish catch was reasonable and that they had no objection to the proposed plan insofar as it affected their interests.

DISCUSSION

66. A cellular steel sheet pile structure with a conservative project life of 25 years is considered to be satisfactory for the proposed breakwater. Tests on corrosion of steel in the Eastport area were made by this office for use in design studies of the Passamaquoddy Power Project. These tests indicate the critical point of maximum corrosion to be at the mud line, which is the most critical point for the stability of the structure. Cathodic protection below the waterline and protective coatings above the waterline could be used to prolong the life of the steel to considerably more than the conservative 25 years used in this study. The effective use of methods to reduce maintenance and extend the project life should be investigated thoroughly during the final design of the breakwater.

67. Construction of the Passamaquoddy Tidal Power Project would place Eastport Harbor in the lower tidal pool where the tidal water level will range from 0 to 8 feet above mean low water. Because the power project is not yet authorized the breakwater should be authorized to a height of 26 feet above mean low water. If such a project is

found to be feasible and becomes a reality, it is estimated a reduction of 10 feet in the top elevation would give the same navigation use. The construction cost of the breakwater would be reduced by about 15 percent, an amount now estimated at $80,000.

68. Construction of the power project would have little effect on wave action at the central waterfront. However, a dam at Western Passage and the controlled water level in the lower pool would provide additional shelter for the fish cannery docks near Clarks Ledge. These docks would have to be relocated to permit construction of the lock at Western Passage. If they were rebuilt in the same general location the additional shelter provided by the dam would permit use of their docks more often than is now possible. This would reduce the need for and prospective benefit resulting from the central waterfront breakwaters. The amount of reduction in benefit has been estimated at about 10 percent of the total benefit, or about $8,000 annually.

69. The net result of construction of the power project on the breakwater now under consideration at Eastport Harbor depends on the relative times of their construction. If the power project was built first, the navigation project would have a lower first cost and a slightly higher benefit cost ratio. If the navigation project was built first there will be no reduction in construction costs but slight reduction in benefits after the power project was built. It is therefore expected that construction of the power project would not have a decisive effect on the economic justification of the navigation improvement considered in this report.

CONCLUSIONS

70. The desires of local interests and the reasonably prospective needs of fishing boats, sardine carriers, and other ferry and cargo vessels would be satisfied by providing a breakwater 500 feet long parallel to the central waterfront and an anchorage basin of 1.4 acres with depths of 10 and 14 feet behind the breakwater. The resulting benefits from commercial navigation are sufficient to justify the work. The benefit-cost ratio is 2.3. The total estimated first cost of construction, exclusive of preauthorization study costs is (March 1959) $550,000. All benefits are general benefits, therefore, none of the cost of construction will be required of local interests.

71. Since there is no public landing in the vicinity of the proposed Federal improvements, local interests should be required to provide a public landing joining the breakwater to shore with suitable berthing facilities, at an estimated cost of $150,000. Local interests are willing to meet the indicated requirements of local cooperation.

If the project is authorized funds for the entire improvement should be appropriated in one fiscal year to assure economical prosecution of the work.

RECOMMENDATION

72. It is recommended that a Federal navigation project for the improvement of Eastport Harbor, Maine, be authorized to provide for a breakwater 26 feet above mean low water and 500 feet long, parallel to the central waterfront and an anchorage basin of 1.4 acres with depths of 10 and 14 feet, generally as shown on the inclosed map. The estimated construction cost is (March 1959) $550,000 for new work, with $1,600 annually for maintenance.

73. This improvement is recommended subject to the condition that local interests:

a. Provide without cost to the United States all lands, easements, and rights-of-way for the construction and maintenance of the project when and as required.

b. Hold and save the United States free from damages that may result from the construction works and maintenance of the project.

c. Provide and maintain without cost to the United States an adequate public landing joining the breakwater to shore, with a fish pump, berths and necessary mooring facilities open to all on equal terms.

2 Incls:
1. Map
2. Appendix

ALDEN K. SIBLEY
Brigadier General, U. S. Army
Division Engineer

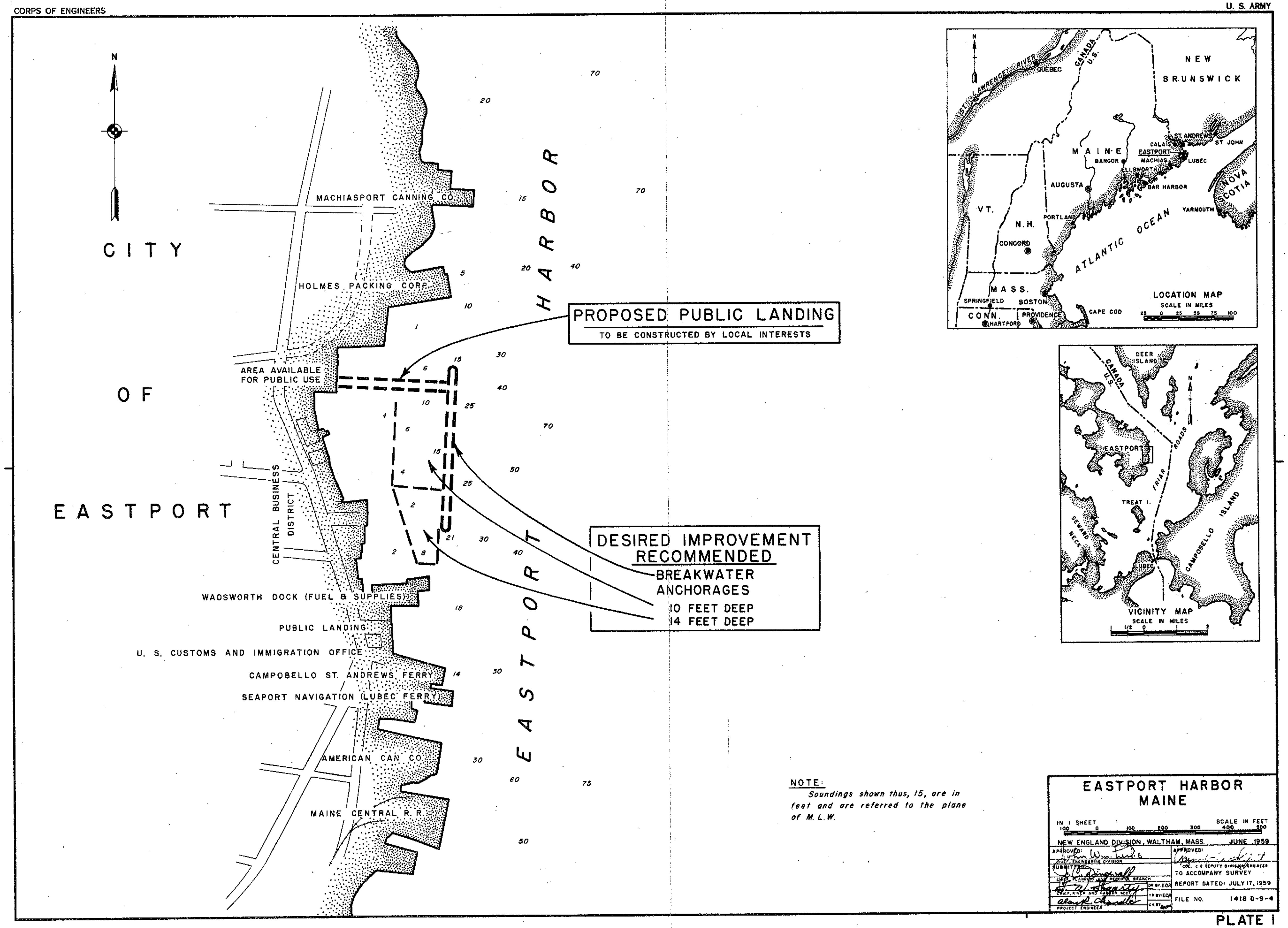
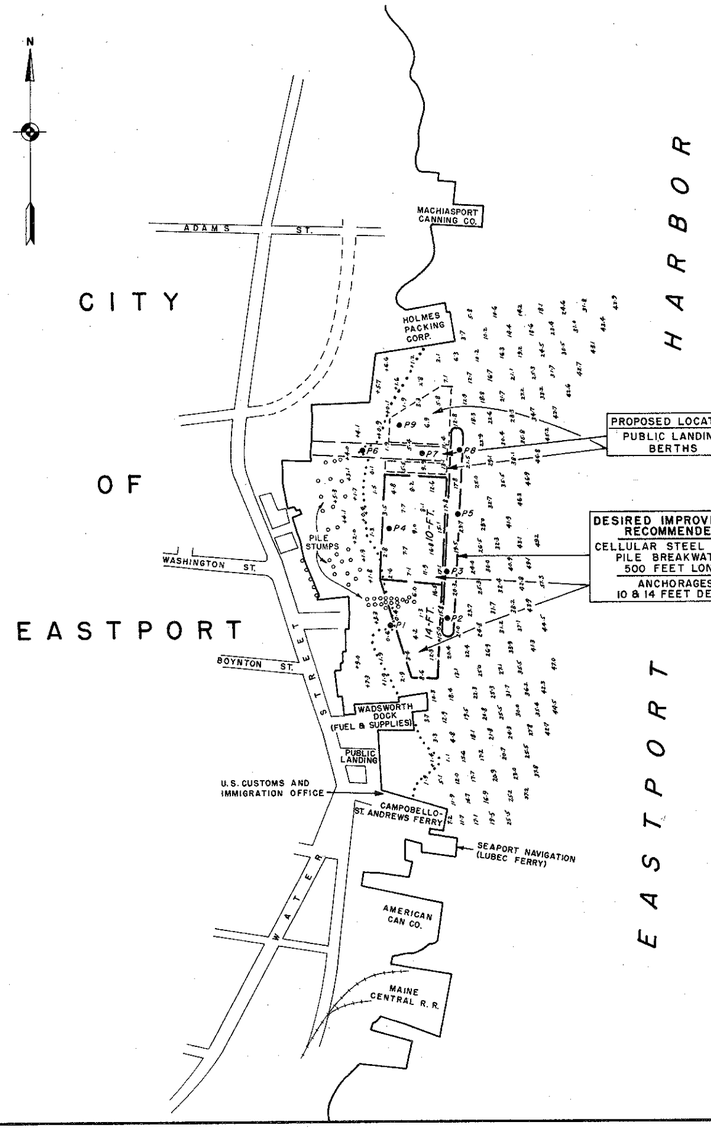

N
CITY OF EASTPORT
CENTRAL BUSINESS DISTRICT
MACHIASPORT CANNING CO.
HOLMES PACKING CORP.
AREA AVAILABLE FOR PUBLIC USE
WADSWORTH DOCK (FUEL & SUPPLIES)
PUBLIC LANDING
U. S. CUSTOMS AND IMMIGRATION OFFICE
CAMPOBELLO ST. ANDREWS FERRY
SEAPORT NAVIGATION (LUBEC FERRY)
AMERICAN CAN CO.
MAINE CENTRAL R.R.
EASTPORT HARBOR
PROPOSED PUBLIC LANDING
TO BE CONSTRUCTED BY LOCAL INTERESTS
DESIRED IMPROVEMENT RECOMMENDED
BREAKWATER
ANCHORAGES
10 FEET DEEP
14 FEET DEEP
NOTE:
Soundings shown thus, 15, are in feet and are referred to the plane of M.L.W.
NEW BRUNSWICK
QUEBEC
ST. LAWRENCE RIVER
CANADA U.S.
MAINE
BANGOR
CALAIS
ST ANDREWS
ST JOHN
EASTPORT
MACHIAS
LUBEC
ELLSWORTH
BAR HARBOR
AUGUSTA
NOVA SCOTIA
YARMOUTH
VT.
N.H.
PORTLAND
CONCORD
ATLANTIC OCEAN
MASS.
SPRINGFIELD
BOSTON
CONN.
HARTFORD
PROVIDENCE
CAPE COD
LOCATION MAP
SCALE IN MILES
25 0 25 50 75 100
DEER ISLAND
CANADA U.S.
EASTPORT
FRIAR ROADS
TREAT I.
SEWARD NECK
CAMPOBELLO ISLAND
LUBEC
VICINITY MAP
SCALE IN MILES
1/2 0 1 2
EASTPORT HARBOR
MAINE
IN 1 SHEET
SCALE IN FEET
100 0 100 200 300 400 500
NEW ENGLAND DIVISION, WALTHAM, MASS. JUNE, 1959
APPROVED:
CHIEF, ENGINEERING DIVISION
SUBMITTED:
CHIEF, PLANNING AND REPORTS BRANCH
CHIEF, RIVER AND HARBOR SECT.
PROJECT ENGINEER
DR. BY: EOP
TR. BY: EOP
CK. BY
APPROVED:
COL. C.E. DEPUTY DIVISION ENGINEER
TO ACCOMPANY SURVEY
REPORT DATED: JULY 17, 1959
FILE NO. 1418 D-9-4

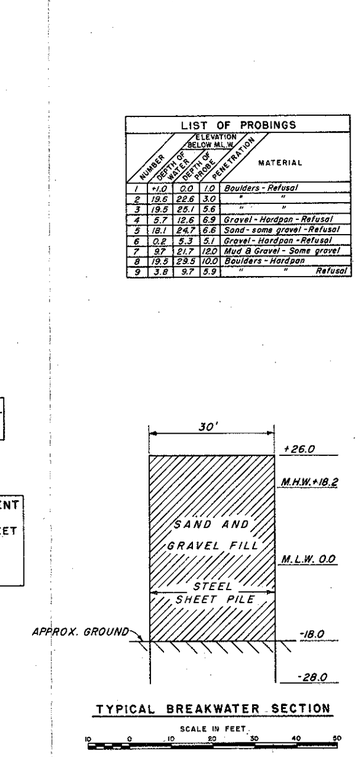
PLATE I

CORPS OF ENGINEERS

U. S. ARMY



LIST OF PROBINGS				
NUMBER	ELEVATION BELOW M.L.W. DEPTH OF WATER	DEPTH OF PROBE	PENETRATION	MATERIAL
1	+1.0	0.0	1.0	Boulders - Refusal
2	19.5	22.6	3.0	" "
3	19.5	25.1	5.6	" "
4	5.7	12.6	6.9	Gravel - Hardpan - Refusal
5	18.1	24.7	6.6	Sand - some gravel - Refusal
6	0.2	5.3	5.1	Gravel - Hardpan - Refusal
7	9.7	21.7	12.0	Mud & Gravel - Some gravel
8	19.5	29.5	10.0	Boulders - Hardpan
9	3.8	9.7	5.9	" " Refusal



TYPICAL BREAKWATER SECTION

SCALE IN FEET.

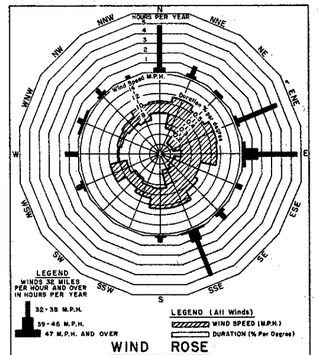
10 0 10 20 30 40 50

LEGEND

PROBINGS SHOWN THUS: ●P1

MEAN HIGH WATER ——————

MEAN LOW WATER ••••••••••



WIND ROSE

PORTLAND, MAINE

OCTOBER 1949 - SEPTEMBER 1958

BASED ON HOURLY OBSERVATIONS BY U.S. WEATHER BUREAU, AT CITY AIRPORT

NOTES

Soundings and probings are in feet and tenths and are referred to the plane of Mean Low Water.

Sounding survey by J. Rock, Jan. 26 - Feb. 6, 1957.

Probing survey by J. Rock, April 22, 1959 by wash method, using 1-1/2" centrifugal pump reduced to 3/4" probing pipe.

Field books: R.B.H. 1167, 1168, 1169 & 1368.

EASTPORT HARBOR MAINE

SURVEY MAP

IN 1 SHEET 100 0 100 200 300 400 SCALE IN FEET 500

NEW ENGLAND DIVISION, WALTHAM, MASS. JUNE, 1959

SURVEYED BY: [illegible]

CHIEF, ENGINEERING DIVISION

CHIEF, SURVEYS AND MAPS BRANCH

CHIEF, RIVER AND HARBOR SECTION

PROJECT ENGINEER

APPROVED: [illegible]

COL. C.E. DEPUTY DIVISION ENGINEER

TO ACCOMPANY SURVEY

REPORT DATED JULY 17, 1959

FILE NO. 1418 0-9-4

PLATE 2

SURVEY OF EASTPORT HARBOR, MAINE

APPENDIX

ESTIMATE OF FIRST COST

1. The first cost has been estimated for the improvement considered in this report. Federal construction consists of building and filling a cellular steel sheet pile breakwater 500 feet long with a maximum width of 30 feet and a height of 26' above mean low water and dredging an anchorage of about 1.4 acres with depths of 10 and 14 feet below mean low water.

2. Probings made during the study indicate a firm material consisting of sand, gravel, and boulders in the area of improvement. This will assure firm footing for the sheet piling for the breakwater. The dredging cost includes the cost of removing pile stumps in the anchorage area.

3. The estimate of cost is as follows:

Project Cost Estimate (Amounts in Thousands of Dollars)

Cost Account Number	Item		Cost Estimate (March 1959)
09	CHANNELS		
	10' & 14' Anchorage		
	(Dredging 12,000 c.y. hard material @ $2.00/c.y.	25.0)	
	(Contingencies @ 15%	5.0)	
			30.0
10	BREAKWATERS		
	(Steel Sheet Piling: 1500 tons @ $250	375.0)	
	(Filling Cells: 25,000 c.y. @ $1.80	45.0)	
	(Contingencies @ 15%	60.0)	
			480.0
29	Pre-authorization Studies		10.0
30	Engineering and Design		10.0
31	Supervision and Administration		30.0
	TOTAL PROJECT COST		560.0

TOTAL FEDERAL COST	560.0	
NON-FEDERAL CONTRIBUTION	None	
NON-FEDERAL COSTS:		
Public Landing (Including Mooring and Berthing facilities, and Fish Pump (self-liquidating)	150.0	
TOTAL NON-FEDERAL COSTS	150.0	

SUMMARY OF ESTIMATED COSTS

Federal Cost		
Corps of Engineers	560.0	
U. S. Coast Guard	None	
Required Non-Federal Costs		
Cash Contribution	None	
Other Costs	150.0	
TOTAL FEDERAL AND REQUIRED NON-FEDERAL COSTS		710.0